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### **REMARKS**

Entry of this Amendment is proper because it narrows the issues on appeal and does not require further search by the Examiner.

Claims 1-29 are all the claims presently pending in the application. Claims 1 and 24 have been amended to more particularly define the invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-15 and 24-29 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite. Claim 24 stands rejected under 35 U.S.C. §112, first paragraph as not enabled by the specification.

Claims 1-14, 16-24 and 26-29 stand rejected under 35 U.S.C. §101 allegedly because the claimed invention is directed to non-statutory algorithm type subject matter.

Claims 1-29 stand rejected under 35 U.S.C. §102(b) as being anticipated by Rigoutsos, et al. (COMBINATORIAL PATTERN DISCOVERY IN BIOLOGICAL SEQUENCES: THE TEIRESIAS ALGORITHM, BIOINFORMATICS, Vol. 14, No. 1, Pages 55-67, 1998) (hereinafter, "the Teiresias paper").

These rejections are respectfully traversed in the following discussion.

#### **I. THE CLAIMED INVENTION**

The claimed invention is directed to a system for identifying genes which includes a pattern database comprising patterns of amino acids, an input device for inputting a DNA sequence, and a processor which locates a pattern from said pattern database in said DNA sequence to identify a putative gene in said DNA sequence.

Conventional systems for identifying genes (e.g., putative genes) are either based on the

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use the statistics of DNA sequences, or the use of similarity searches to determine gene locations (Application at page 2, lines 7-22). However, these conventional methods have various problems which prevent them from efficiently identifying genes in a given DNA sequence (Application at page 3, line 19-page 4, line 21).

The claimed invention, on the other hand, includes a processor which locates a pattern from the pattern database in the DNA sequence to identify a putative gene in the DNA sequence (Application at Figure 1; page 5, lines 4-11). The claimed invention may be considered as including the best characteristics of statistical approaches and database similarity searches, in identifying genes in a give DNA sequence (Application at page 6, lines 18-21).

## II. THE 35 USC §112, SECOND PARAGRAPH REJECTION

The Examiner alleges that claims 1-15 and 24-29 are indefinite. Applicant submits, however, that these claims are clear and not indefinite.

Specifically, the Examiner alleges that claim 1 recites "discovers a pattern from said pattern database..." and it is unclear whether the discovery of a pattern resulted from the DNA sequence being directly compared to a pattern database of amino acids, or from the comparison of the processed DNA to the pattern database of amino acids.

Applicant respectfully submits that the examiner may have incorrectly assumed that the claimed invention discovers these patterns "de novo". Actually, the claimed invention locates the patterns (e.g., determines whether the patterns are present or absent and if present keep track of the location) in the DNA sequence.

Thus, to address the Examiner's concerns, Applicant notes that claim 1 has been amended to recite "a processor which locates a pattern from said pattern database in said DNA sequence to identify a putative gene in said DNA sequence". Therefore, claim 1 is clear and not indefinite.

Further, the Examiner alleges that claim 29 presents "the same issue". However, Applicant notes that claim 29 does not include the term "discovers", but instead includes a processor which "locates instances of said patterns of amino acids in said DNA sequence to

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identify a putative gene in said DNA sequence". Therefore, there can be no concern about the term "discovers" as the Examiner expressed with respect to claim 1. Therefore, claim 29 is clear and not indefinite.

In view of the foregoing, the Examiner is respectfully requested to withdraw this rejection.

### III. THE 35 USC §112, FIRST PARAGRAPH REJECTION

The Examiner alleges that claim 24 is not enabled by the specification. Applicant notes, however, that claim 24 has been amended to address the Examiner's concerns. Therefore, Applicant submits that this claim is fully enabled by the specification.

In view of the foregoing, the Examiner is respectfully requested to withdraw this rejection.

### IV. THE 35 USC §101 REJECTION

Claims 1-14 and 16-23 and 26-29 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory algorithm type subject matter. Applicant submits, however, that these claims are clearly statutory subject matter and patentable.

Indeed, the Examiner surprisingly attempts to support her allegations by referring to MPEP § 2106 (IV)(B)(2)(b), part ii, and stating that "the processes for discovering patterns performed by said processor do not cause any physical alteration outside of the claimed system, as a result of the processes. A system which processes data and does not cause any physical alteration outside of the claimed system, as a result of the processes performed on said data, is considered to be non-statutory subject matter".

However, Applicant would point out to the Examiner that **MPEP § 2106 (IV)(B)(2)(b) covers only "Statutory Process Claims"**. Claims 1 and 29 are not directed to processes but are instead directed to a "system for identifying genes" which includes at least an input device and a

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processor.

Thus, at least with respect to claims 1 and 29, the Examiner's reliance on this section of the MPEP is misdirected. Instead, Applicant would direct the Examiner to MPEP § 2106 (IV)(B)(2)(a) which is entitled "Statutory Product Claims" and states "[i]f a claim defines a **useful machine or manufacture by identifying the physical structure of the machine or manufacture in terms of its hardware or hardware and software combination, it defines a statutory product**" (emphasis added) (citing *In Re Lowry*, 32 F.3d 1579 at 1583, and *In Re Warmerdam*, 33 F.3d 1354 at 1361-1362).

Thus, Applicant respectfully submits that claims 1 and 29 are clearly statutory subject matter under MPEP § 2106 (IV)(B)(2)(a).

Further, claim 23 is directed to a *"programmable storage medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method for identifying genes"*. Thus, like claims 1 and 29, claim 23 is not directed to a "process" and therefore, is not covered by MPEP § 2106 (IV)(B)(2)(b). Indeed, Applicant would direct the Examiner to MPEP § 2106 (IV)(B)(1)(a) which states:

*" a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory"*.

Thus, MPEP § 2106 (IV)(B)(2)(b) clearly does not apply to the programmable storage medium defined in claim 23.

Further, with respect to claim 16, Applicant would point out that MPEP § 2106 (IV)(B)(2)(b)(ii) on which the Examiner relies, addresses only "Computer-Related Processes". Specifically, this section deals only with activity (e.g., manipulation of data or "number crunching") that is performed within a computer.

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While claim 16 is directed to a “method of identifying genes”, the claim **nowhere recites the term “computer”**. That is, this claim is not necessarily computer-related and certainly is not necessarily limited to activity that is performed within a computer. Thus, MPEP § 2106 (IV)(B)(2)(b)(ii) clearly does not apply to the method defined in claim 16.

Again, Applicant would point out that a claim may be said to define statutory subject matter “when the machine, as claimed, produces a concrete, tangible and useful result” (*State Street Bank and Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368, 1374 (Fed. Cir. 1998)). In the present case, the claimed invention (e.g., as recited in claim 1) includes “*a processor which locates a pattern from said pattern database in said DNA sequence to identify a putative gene in said DNA sequence*”. That is, in this exemplary embodiment, the processor may access the pattern database, and may locate a pattern from the pattern database in the DNA sequence (which was input by the input device) to identify a putative gene. The Applicant is puzzled how the Examiner can suggest that this is not a concrete, tangible and useful result, as required by *State Street Bank*. Clearly, the Examiner is incorrect, and the claims clearly define patentable subject matter.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

## V. THE TEIRESIAS PAPER

The Examiner alleges that the Teiresias paper teaches the claimed invention. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by the Teiresias paper.

However, contrary to the Examiner’s allegations, the Teiresias paper does not teach or suggest “*a processor which locates a pattern from said pattern database in said DNA sequence to identify a putative gene in said DNA sequence*”, as recited, for example, in claim 1, and similarly recited in claims 16, 23 and 29.

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As noted above, unlike conventional systems for identifying genes (e.g., putative genes) which are either based on the use of the statistics of DNA sequences, or the use of similarity searches to determine gene locations, the claimed invention includes a processor which locates a pattern from the pattern database in the DNA sequence to identify a putative gene in the DNA sequence (Application at Figure 1; page 5, lines 4-11). That is, the claimed invention may be considered as including the best characteristics of statistical approaches and database similarity searches, in identifying genes in a give DNA sequence (Application at page 6, lines 18-21).

Clearly, these features are not taught or suggested by the Teiresias paper.

As noted above, Applicant suspects that the Examiner may incorrectly assume that the claimed invention is directed to a "de novo discovery" of patterns. Applicant respectfully points out, however, that the claimed invention is not necessarily directed to a "de novo discovery" of patterns.

Further, even if the claimed invention is directed to a de novo discovery of patterns, the claimed invention is not taught or suggested by the the Teiresias paper references. Indeed, the claimed invention HAS NOTHING TO DO with the the Teiresias paper reference (which, by the way, is a paper authored by an inventor in the present Application and pertaining to Teiresias).

The Examiner attempts to rely on the leghemoglobin section of the Teiresias paper (e.g., page 61) to support her position. However, Applicant respectfully submits that the Teiresias paper and the stated leghemoglobin example have nothing to do with the current invention and neither does the PROSITE reference to which the Examiner refers in the Office Action.

As previously pointed out to the Examiner, the Teiresias paper discloses an algorithm (e.g., the Teiresias algorithm) for **discovering** in a biological sequence. In contrast, the claimed invention may **use such patterns which have already been discovered** using the Teiresias algorithm (as disclosed by the Teiresias paper) to identify genes in a DNA sequence.

That is, the Teiresias paper was directed to "pattern discovery", whereas the claimed invention may be considered to be directed to gene identification (e.g., "gene discovery") which

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involves locating patterns (which have already been discovered) in a DNA sequence. This is completely different than the pattern discovery method disclosed in the Teiresias paper. Indeed, nowhere is gene identification (e.g., "gene discovery") taught or suggested in the Teiresias paper.

In fact, **most surprising is the fact that the Examiner has not even attempted to identify any disclosure in the Teiresias paper which pertains to identifying a putative gene.**

The Examiner merely alleges that Teiresias paper determines "matches by generating a scoring matrix". Applicant notes that even assuming (arguendo) that this is correct, it has nothing to do with identifying a putative gene.

Therefore, contrary to the Examiner's allegations, the Teiresias paper does not teach or suggest **a processor which locates a pattern from the pattern database in the DNA sequence to identify a putative gene in the DNA sequence.**

Further, Applicant respectfully requests that if the Examiner insists on maintaining this unreasonable rejection, the Examiner **must** identify in the next Office Action where the Teiresias paper teaches **identifying a putative gene in a DNA sequence by locating a pattern (e.g., from a pattern database) in the DNA sequence.** Applicant respectfully submits that such teaching or suggestion does not exist in the Teiresias paper, and therefore, the Examiner should withdraw this rejection.

Therefore, Applicant submits that there are elements of the claimed invention that are not taught or suggested by the Teiresias paper. Therefore, the Examiner is respectfully requested to withdraw this rejection.

## VI. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-29, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

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Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assignee's Deposit Account No. 50-0510.

Respectfully Submitted,

Date: 10/22/04



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**CERTIFICATE OF FACSIMILE TRANSMISSION**

I hereby certify that the foregoing Amendment was filed by facsimile with the United States Patent and Trademark Office, Examiner C. Dune Ly, Group Art Unit # 1631 at fax number (703) 872-9306 this 22<sup>nd</sup> day of October, 2004.



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